place of one which was originally granted by the Highland Society. Teachers of agricultural science have alleged that the regulations in connection with the national diploma are unsatisfactory, but notwithstanding the attempts of the Agricultural Education Association to secure their improvement, the joint board seems unwilling to alter the conditions of awarding diplomas. Prof. Wallace, of Edinburgh University, enumerates some of the disadvantages attached to the present state of affairs in a recent pamphlet, and among them he mentions that Scottish students have to travel twice to Leeds to be examined by a board from which teachers of agriculture are practically excluded, that the present scheme encourages cramming, and that it is national only in name. Prof. Wallace has obtained the opinion of the Solicitor-General of Scotland as to the position of the Highland Society in relation to its Charter on Education, 1856. This Charter empowers and requires the council of the Highland Society to appoint a board of examiners and to grant diplomas, and the opinion of counsel is that by its action in 1899 in agreeing to the joint board, the council of the Society is not acting in conformity with the provisions of its Charter. Prof. Wallace is, it appears, entitled to take steps to compel the council to proceed in accordance with the Charter.

THE following announcements of gifts to higher education in the United States have appeared in *Science* since the beginning of December, 1902 :—Mr. James Stillman, 20,000*l.* to Harvard University for the endowment of a professorship in comparative anatomy. Mr. Peabody has offered to the University of Georgia a 10,000*l.* building, provided the Legislature will appropriate to the University for maintenance the sum of 2000*l.* a year for two years, and make improvements costing 240*l.* A bequest of 16,000*l.* was made to Yale University by the will of Mr. Benjamin Barge. Mr. Morris Jesup, 2000*l.* to Princeton University. Mr. John D. Rockefeller, 200,000*l.* to the University of Chicago, to be added to the endowment, and other sums amounting to 105,200*l.* have been given to the same university. Tulane University has been made the residuary legatee of the late Mr. A. C. Hutchinson, and it is expected that it will receive 200,000*l.* The University of Rochester has received 2000*l.* from Mrs. Steele. Yale University will ultimately receive 10,000*l.* for the aid of poor students by the will of the late Mrs. Courrier. Dr. D. K. Pearsons has given to Illinois College, Jacksonville, 10,000*l.*; to Fargo College, Fargo, N. D., 10,000*l.*; to West Virginia Conference Seminary, Buchanan, 10,000*l.*; to Pomona College, at Claremont, 10,000*l.*; and to Fairmount College, Wichita, Kas., 5000*l.* This makes the total of Mr. Pearsons's contributions to colleges 800,000*l.* Mr. Henry Phipps, 60,000*l.* for the establishment in Philadelphia of "The Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis." Cornell College, Iowa, has added 14,300*l.* to its endowment funds. A friend whose name is not yet made public gave 10,000*l.* Mr. Fred W. Brown has given 2000*l.* Harvard University received 10,000*l.* by the will of Rebecca C. Ames, the income to be used for the support of poor students. The University of Pennsylvania received gifts during the year to the value of 187,370*l.* Mr. Robert E. Woodward, 10,000*l.* to the Brooklyn Institute of Arts and Sciences. The Duke de Loubat, 20,000*l.* to Columbia University for the establishment of a chair of American archæology. Oberlin College has received an anonymous gift of 10,000*l.* from the same donor who recently gave 10,000*l.* By the will of the late Prof. Waterhouse, Washington University received 5000*l.*, and Harvard University and Dartmouth College each 1000*l.* Mr. S. M. Inman, 5000*l.* toward the proposed Presbyterian university to be erected in Atlanta, Ga. Cornell University has received an anonymous gift of 30,000*l.* for the establishment of a pension fund. Mr. James B. Colgate, 20,000*l.* to Colgate University, Hamilton, N.Y., to which he had already given more than 200,000*l.* Mr. Andrew Carnegie, 20,000*l.* to Western Reserve University for the establishment of a school for the training of librarians. Columbia University received 2000*l.* for the establishment of a scholarship by the will of Mrs. Banker. It thus appears that in three months universities and colleges of the United States have, owing to the liberality of American citizens, benefited to the extent of more than one and a quarter millions sterling.

SCIENTIFIC SERIAL.

Journal of Botany, March.—Under Limonium Mr. E. S. Salmon discusses the varieties and synonyms which Hooker, in his "Student's Flora," places together under *Statice auriculaefolia.*—The fresh-water algæ reviewed by Messrs. W. West and G. S. West are mostly small Chlorophyceæ, and include five new species and a new genus, Polychætophora.—The notes on Myricaceæ contributed by Dr. Rendle were prompted by a rearrangement of the British Museum plants consequent upon Chevalier's recent revision of the group, whereby certain forms are separated from Myrica to form the new genera Gale and Comptonia.—The diagnoses presented by Mr. Spencer Moore refer to new sympetalous plants collected in the Coolgardie district of W. Australia.—The following short articles occur :—"Rubi of the Neighbourhood of London," by Rev. W. M. Rogers; "*Lepidium Smithii,*" var., by Mr. F. Townsend; "Possible Use of Essential Oils in Plant Life," by Dr. G. Henderson.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 5.—"The Differential Invariants of a Surface, and their Geometric Significance." By Prof. **Forsyth,** F.R.S.

The present memoir is devoted to the consideration of the differential invariants of a surface; and these are defined as the functions of the fundamental magnitudes of the surface and of quantities connected with curves upon the surface which remain unchanged in value through all changes of the variables of position on it. They belong to the general class of Lie's differential invariants; and some sections of them were obtained about ten years ago by Prof. Zorawski, who, for this purpose, developed a method originally outlined by Lie. Earlier, they had formed the subject of investigations by a number of geometers, among whom Beltrami and Darboux should be mentioned.

Prof. Zorawski's method is used in this memoir. In applying it, a considerable simplification proves to be possible; for it appears that at a certain stage in the solution of the partial differential equations characteristic of the invariance, the equations which then remain unsolved can be transformed so that they become the partial differential equations of the system of concomitants of a set of simultaneous binary forms. The known results of the latter theory can then be used to complete the solution.

The memoir consists of two parts. In the first part, the algebraic expressions of the invariants up to a certain order are explicitly obtained; in the second, their geometric significance is investigated.

An invariant, which involves the fundamental quantities of a surface E, F, G, L, M, N (these determine the surface save as to position and orientation in space) and their derivatives up to order n, as well as the derivatives of functions ϕ, ψ, of position on the surface up to order $n+1$, may itself be said to be of order n. The invariants up to the second order inclusive are obtained. It appears that, if two functions ϕ and ψ occur, all the invariants that occur up to the second order can be expressed algebraically in terms of 29 algebraically independent invariants; while, if only a single function ϕ occurs, all the invariants that occur up to the second order can be expressed in terms of 20 algebraically independent invariants.

The significance of these respective aggregates of 29 and of 20 invariants is obtained in connection with curves

$$\phi = 0, \quad \psi = 0,$$

drawn upon the surface. The investigation reveals new relations among the intrinsic geometric properties of a curve upon a surface. In particular, up to the second order, four such relations exist for a single curve, and their explicit expressions have been constructed.

March 12.—"On the Histology of *Uredo dispersa*, Erikss., and the 'Mycoplasm' Hypothesis." By Prof. H. Marshall **Ward,** F.R.S.

The paper deals with a detailed study of the histological features of the germination, infection and growth of the mycelium of the Uredo in the tissue of grasses. Primarily, the figures refer especially to the Uredo of *Puccinia dispersa* in the tissues of *Bromus secalinus*, but comparisons are made with the behaviour of this and other Uredineæ—*e.g. Puccinia glumarum* and *P. graminis*—in the tissues of other grasses and cereals.

The research, which has been carried on for more than a year and a half, and has involved the preparation and microscopic examination of thousands of sections, is principally based on the application of improved hardening and staining methods to preparations from tube cultures of the grasses concerned, the leaves of which were infected at definite spots. These tube cultures were prepared according to the method previously described.[1] At definite intervals after sowing the spores—*e.g.* after one, two, to six and eight days—the infected areas were removed and placed in fixing solutions, and the life-history of the fungus traced step by step, and controlled by reference to uninfected areas.

The full paper is illustrated by numerous figures, and deals with the behaviour of the nuclei, vacuoles, septa, branches, haustoria, and other details of the hyphæ up to the commencement of spore-formation.

The relations of the hyphæ and haustoria to the cell-contents of the host are critically examined, and the cumulative evidence not only fails to support Eriksson's "Mycoplasm" hypothesis, but is completely subversive of it, so far as histological facts are concerned.

Eriksson's hypothesis, which refers the epidemic outbreaks of rust to the sudden transformation into the mycelial form of a supposed infective substance, previously latent and invisible in the cytoplasm of the host, is shown to be untenable because the *corpuscules spéciaux* of this author are proved to be the cut-off haustoria of the fungus.

Eriksson supposes that these *corpuscules* (haustoria) are formed by the hitherto latent germs in the host-cells, growing up in the cells into vesicles, which then pierce the cell walls and give rise to hyphæ in the intercellular spaces.

The present paper shows that Eriksson has entirely reversed the true order of events. The haustoria have been formed by the hyphæ, and figures are given showing every stage in their development. The first haustorium may be formed by the infecting tube immediately after its penetration through the stoma, and figures are given showing the remains of the germ-tube outside a stoma, the swelling of its tip over the stoma into an appressorium, the passage through the stomatal cavity, and its development into a vesicular swelling whence the true infection tube arises, which latter may at once put forth a haustorium. In some cases all these latter phenomena are visible in one and the same preparation.

The author expresses his thanks to Miss E. Dale, of Girton College, for valuable aid during the later stages of the work, in the embedding and cutting of numerous sections.

"The Œstrous Cycle and the Formation of the Corpus Luteum in the Sheep." By Francis H. A. **Marshall.** Communicated by Prof. J. C. Ewart, F.R.S.

Physical Society, March 13.—Dr. R. T. Glazebrook, F.R.S., president, in the chair.—A paper by Dr. **Farr,** on the interpretation of Milne seismograms, was read by Dr. Chree. Prof. Milne and Dr. Omori have come to the conclusion that the tilts represented by the maximum displacement of the boom of a horizontal pendulum seismograph are too large to be admissible as true tilts. The author has investigated the motion of the boom analytically, and his results show: (1) that the boom does not vibrate with its own natural period, but takes the frequency of the disturbing force; (2) that the friction should be small compared with the difference of the squares of the frequencies; and (3) that the phenomenon of beats may occur between the forced vibration and the free period of the boom. The maximum amplitude of swing of the boom gives no information whatever of the amplitude of the disturbing cause without also a knowledge of the periods of the forced and free vibrations. The author shows how to determine the amplitude of the wave by observations on these quantities. The author has verified the results of his analysis by experiments with artificial waves of known periods produced by an apparatus described in the paper. In conclusion, it appears (1) that strict attention should be paid to recording accurately the period of free vibration of the boom; (2) that the tape should be driven at such a speed as to enable the period of forced vibration to be determined; (3) that the effect of friction should be recorded.—A potentiometer for thermocouple measurements was exhibited and described by Dr. **Lehfeldt.** To make a satisfactory potentiometer for thermoelectric work, it is essential that it shall not introduce a high resistance in the circuit of the couple and galvanometer. Most of the potentiometers on the market, well enough for comparing voltaic cells, fail in this respect. Dr. Lehfeldt has therefore designed an instrument specially suited for thermocouple work.—Dr. J. A. **Harker** exhibited and described a direct-reading potentiometer for thermoelectric work. The instrument represents a form which has been designed and made in the National Physical Laboratory. Dr. Harker has experienced similar difficulties to Dr. Lehfeldt, and the instrument which he has designed is similar in many respects to the one exhibited by him.—A paper on the measurement of small resistances was read by Mr. A. **Campbell.** The object of this paper is to give a brief account of a number of measurements of a set of low resistance standards belonging to the National Physical Laboratory. The tests were made partly with a view to comparing various methods of measurement. The resistances were of manganin, and their nominal values were approximately 0·1, 0·01, 0·001 international ohms. The following methods were employed:—(1) Shunt potentiometer; (2) Kelvin bridge; (3) two-step bridge; (4) differential galvanometer; (5) Matthiessen's and Hockin's method. The last method was found to be much less accurate than the other four. The results obtained from the other methods are tabulated in the paper, and show very satisfactory agreement.—Dr. R. A. **Lehfeldt** read a paper on a resistance comparator. Objecting to sliding-contacts on account of the thermoelectric effects they tend to introduce, and irregularities slide-wires show when a good deal used, the author has substituted for the slide-wire two coils of 99 ohms each connected by twenty coils of 0·1 ohm each. The latter are arranged circularly, so that a switch connected to the galvanometer may be set on any one of the intervening studs. The galvanometer deflections are taken for the two positions nearest balance and interpolation to 1/100 calculated. In this way an accuracy of one part in 100,000 is attainable. The author thinks there is a gain of accuracy as well as of convenience in using the interpolation method.

Royal Astronomical Society, March 13.—Prof. H. H. Turner, president, in the chair.—The secretary read a letter from Mr. S. C. **Chandler** directing attention to a new term in the variation of latitude that had been discovered by Mr. Kimura, of the International Latitude Station in Japan. Mr. Chandler had been unable to find any probable explanation for the term, and proposed that, for its investigation, a southern belt of latitude stations should be established, suggesting stations at Sydney, the Cape of Good Hope and Santiago de Chile.—Mr. **Newall** read a paper on observations made at Cambridge of the velocity in the line of sight of certain selected stars, his communication being the first instalment of a work undertaken in accordance with a scheme of cooperation.—A paper by Dr. Max **Wolf** on three of Sir W. Herschel's observed nebulous regions in Orion was read, illustrated by a photograph, including three of the regions described by Sir W. Herschel as nebulous, but in which Dr. Isaac Roberts's photographs had shown no nebulosity. Dr. Wolf's photographs, on the contrary, showed considerable nebulosities. Dr. Roberts criticised Dr. Wolf's results, and read a communication of his own on photographs of various nebulæ, including ten which are new.—Mr. Whittaker gave an account of a communication from Prof. Simon **Newcomb** on the desirability of a reinvestigation of the problems arising from the mean motion of the moon. Prof. Newcomb called attention to the discrepancies between the predicted and observed places of the moon, and showed the comparative failure of attempts hitherto made to explain them. He considered it necessary to reinvestigate the whole question *ab initio*, and suggested a thorough comparison of the tabular and observed places of the moon, to be undertaken by a system of international cooperation. The Astronomer Royal and others took part in the discussion on Prof. Newcomb's paper.—A series of photographs presented by the Yerkes Observatory was shown on the screen. The photographs were taken by Mr. G. W. **Ritchey**, those of the moon with the 40-inch refractor and a colour screen, and those of nebulæ, &c., with the 24-inch reflector.—A paper by Mr. Stanley **Williams** was read on the short period variable star UY Cygni.—Other papers were taken as read.

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[1] "On Pure Cultures of a Uredine, *Puccinia dispersa* (Erikss.)" (*Roy Soc. Proc.*, 1902, vol. lxix. p. 461).

Anthropological Institute, March 10.—Dr. J. G. Garson in the chair.—(1) Skulls from the Daurs' graves, Driffield, Yorkshire; (2) a method to facilitate the recognition of Sergi's skull types, by Dr. William **Wright.** Dr. Wright described twenty-two skulls, fifteen being those of males and seven of females. Nine of these he showed were dolichocephalic, five mesaticephalic, while he was in doubt as to the classification of the remaining eight, owing to their precarious state. The cephalic index ranged from sixty-eight to seventy-nine, and the skulls evidently were those of a mixed race which was on the whole dolichocephalic. According to Sergi's natural method ten of them belonged to the class *Ellipsoides isocampylos*, seven to *Isobathys Siculus*, whilst the remainder were of *Ellipsoides ametopus, Ellipsoides depressus*, and *Parallelepipedoides* types. The graves were of the early Iron age, iron articles being found in them, and the burials being of the usual simple type. As to the origin of the people buried, Dr. Wright suggested two hypotheses: either they were the direct descendants of the dolichocephalic Neolithic British or they were settlers from the Continent. In support of the latter hypothesis, Dr. Wright pointed out that the settlement was very near the coast, and that there were two others close by, at Arras and Beverley. It was clear, from the absence of weapons and the presence of women and children in the interments, that the settlers were peaceful people. On the whole he was inclined to think that the people came from northern Europe and Scandinavia, which at that period were peopled by a comparatively pure dolichocephalic race. In his second paper Dr. Wright explained a method for facilitating the recognition of Sergi's skull types. He said that he felt the great difficulty in Sergi's system was the vague definition of the types. To facilitate the recognition, Dr. Wright draws, on a photograph of the skull, a circle the radius of which is half of the maximum diameter of the skull, when the different types are recognised through different parts of the skull falling either within or without the circle. This method further gives aid to the eye of the observer by providing a uniform curve with which to compare the anterior and posterior outlines of the cranium. Dr. Wright illustrated the system by lantern slides showing the method as applied to the different aspects of the skull.

Royal Meteorological Society, March 18.—Captain D Wilson-Barker, president, in the chair.—Mr. C. V. **Boys,** F.R.S., gave a lecture on the transmission of sound through the atmosphere. He began by contrasting the apparent behaviour of waves of water, sound waves and light waves with respect to physical law, and showed that these were merely an effect of the relative scale of the wave-length and the means of observation. He pointed out the perfection of the behaviour of ripples and very small water waves. There is a difficulty in making experiments with sound with apparatus smaller than houses or hills, unless sound waves so short as to be inaudible are employed. Mr. Boys showed the obedience of sound to the ordinary optical laws. Sound waves may, in special circumstances, become visible. By means of lantern slides the lecturer showed that the air waves in bullet photographs are visible, and animatograph representations were given of the shadow of the sound of a great explosion, and also of Prof. Wood's photographs of the reflection of sound waves. Reference was made to Dr. Rapp's interference observations of sound waves produced by instruments and by the voice. The lecturer explained that light has, in a minor degree, the same kind of imperfection so noticeable with sound. He concluded by referring to mirage and looming in optics, and stated that the corresponding phenomena in acoustics give rise to abnormal audibility of sound.

CAMBRIDGE.

Philosophical Society, February 16.—Mr. Seward, vice-president, in the chair.—On the dynamics of the electric field, by Prof. J. J. **Thomson,** F.R.S. It is shown that all the laws relating to the distribution of momentum in the field follow from the view that the lines of electric force carry along them a portion of the ether through which they pass, the mass of ether entangled with the tubes being per unit volume proportional to the electrostatic energy of the field in that unit volume; the ether thus entangled can slide along the line of electric force, but as far as motion at right angles to the line is concerned, the entangled ether moves with the line of force, the momentum in the electric field is the momentum of the ether gripped by the lines of force. It was suggested that all mechanical momentum and not merely electrical momentum was really momentum of the ether; the molecules of matter containing a number of electrified bodies ("corpuscles"), the lines of force starting from these corpuscles grip a certain amount of the ether and that the mass of the body is really the mass of the ether gripped by the lines of electric force starting from its corpuscles. The potential energy of the field is on this view the kinetic energy of the turbulently moving ether imprisoned by the lines of force.—Rust-fungi and the "mycoplasm" hypothesis, by Prof. H. Marshall **Ward,** F.R.S. The author gave a brief account, illustrated with lantern slides and microscopic preparations, of that part of his researches into the histology of rust-fungi which bears upon the recent pronouncement of Eriksson, that certain *corpuscules spéciaux* observable in the cells of the host-plant are the assumed "mycoplasm" in the act of growing out to form the hyphæ of the fungus. The author's preparations show clearly that Eriksson's *corpuscules* are true haustoria put forth by the hyphæ of the fungus into the cells of the host. Every stage in their development is traced, and since the entering germ-tube, after swelling up as an infecting vesicle and tube in the stomatal cavity, is found to put forth one of these haustoria at a very early date, the reversed order of the phenomena assumed by Eriksson cannot be accepted.—On radio-activity from snow, by Mr. C. T. R. **Wilson,** F.R.S. An experiment of the same nature as those already made with freshly fallen rain and described before this Society (*Proceedings*, vols. xi., p. 428, and xii., p. 17, 1902) was made with freshly fallen snow at Peebles on January 10. The snow was melted and 50 c.c. of the water were evaporated to dryness in a porcelain basin. This was then inverted over the thin aluminium roof of the ionisation apparatus used as a detector of radio-activity (described in the first of the above-mentioned papers). The results give no indication of any difference in the intensity of the radio-activity obtained from equal weights of snow and rain.—Note on the slipperiness of ice, by Mr. S. **Skinner.** The slipperiness of ice has been attributed to the presence of a layer of lubricating water under the body pressing on the ice. The water is produced by the lowering of the freezing point where the pressure is experienced. On this view the object glides on a liquid layer, and consequently viscous friction in water takes the place of the rubbing friction between the solids. Joly has shown by calculation that the weight of a man concentrated on the blade of a skate is sufficient to lower the freezing point very considerably, and Reynolds, arguing from the difficulty of slipping on very cold ice, comes to the same conclusion. In the present paper it is pointed out that sliding on a liquid layer is a condition under which cavitation will occur in the liquid, and that this will aid the slipping.—On the rise of a spinning top, by Mr. E. G. **Gallop.**—On automorphic functions and the general theory of algebraic curves, by Mr. H. W. **Richmond.**

March 2.—Dr. Baker, president, in the chair.—On the probable presence in the sun of the newly discovered gases of the earth's atmosphere, by Prof. **Liveing,** F.R.S. Stassano recently pointed out that the chromospheric rays measured by Deslandres and Hale correspond closely with rays found to be emitted by the most volatile gases of our atmosphere, and of the 339 chromospheric and coronal rays photographed by Humphreys during the total eclipse of May, 1901, 200 agree within one unit of wave-length with rays either of the more volatile gases or with rays of krypton, xenon, or argon. Until more exact measures of the wave-lengths are to hand it is not possible to prove coincidence. The author shows that theoretically there must be an interchange of atmospheric gases between sun and planets, that the interplanetary space could not be a vacuum but must contain many millions of molecules per cubic centimetre, and that the interchange would not depend on the number of molecules which would chance to acquire velocity enough to carry them beyond the earth's attraction, but upon diffusion with only the average kinetic energy of the molecules, which takes place with extreme rapidity when the free path is long.—On a synthesis of carboxy-derivatives of pyridine, by Mr. W. J. **Sell**, F.R.S., and Mr. F. W. **Dootson**.—Experiments illustrating new reactions for the identification of urea and of primary amines, by Mr. H. J. H. **Fenton**, F.R.S. These experiments illustrated the application of a certain new derivative of methyl-furfural as a reagent for the identification of certain organic nitrogen compounds.—(1) A rapid method of estimating sugars; (2) selection of seeds by chemical methods, by Mr. T. B. **Wood** and Mr. R. A. **Berry**. Attention was directed to the importance of selecting for seed production, mother plants of superior chemical composition, and to the great improvement brought about in sugar beet, and in certain American wheats, by the systematic application of such methods. A description was given of the first year's work in attempting to apply chemical methods to the selection of mother plants of the mangel, swede and kohl rabi for growing seed.—Methods of preparation of osones, by Mr. R. S. **Morrell**.—Note on the stereochemistry of benzene, by Mr. H. O. **Jones** and Mr. J. **Kewley**. The authors prepared the dextro-camphor-sulphonate (Reychler) and the dextro-bromo-camphor-sulphonate of 1 : 3 : 4-methyl-chloro-amino-benzene and examined their rotatory powers after repeated recrystallisation from non-hydroxylic solvents. Both salts were found to have values for their molecular rotatory power practically identical with those of salts of the respective acids with inactive bases, and the base recovered from the salts was quite inactive. Hence, unless both salts are partially racemic; the benzene compound is incapable of showing optical activity.—A method of detecting nickel and cobalt in presence of each other, by Mr. F. W. **Dootson**. The method depends upon the difference in colour of ethereal solutions of the double thiocyanates of nickel or cobalt and potassium.—On the Joule-Thomson effect, by Mr. P. V. **Bevan**.—On a sensitive gold-leaf electrometer, by Mr. C. T. R. **Wilson**, F.R.S. The electrometer is sufficiently sensitive to give a deflection per volt of 180 scale divisions of the eye-piece micrometer of the reading microscope. The increased sensitiveness has been secured without increasing the capacity of the instrument. It is therefore specially suitable for the measurement of very small quantities of electricity.—A new mineral from the Binnenthal, by Mr. R. H. **Solly**. This mineral belongs to the group of sulpharsenites of lead, and is closely allied to rathite and baumhauerite.

Manchester.

Literary and Philosophical Society, March 3.—Mr Charles Bailey, president, in the chair.—A paper entitled "Further Investigation of the Detection and Approximate Estimation of Minute Quantities of Arsenic in Malt, Beer and Foodstuffs" was read by Mr. W. **Thomson**, who pointed out that he had greatly improved the process which he had already published, and that by this improved method he had been able to obtain a very distinct mirror of arsenic in beer, for instance, when it existed to the extent of 1/3000 part of a grain per gallon, when working on 50 c.c., which is equivalent to less than a sherry glassful of the beer. This is equivalent to the detection of about one part in two hundred and eighty millions of beer.—Prof. H. B. **Dixon**, F.R.S., exhibited an electrolytic Marsh apparatus for the detection of arsenic, which had been approved by the Government authorities, and he claimed that it was sufficiently delicate for the purpose in view.—Mr. Francis **Jones** referred to the recent observations on the bending of marble made by Prof. See, of Washington, and pointed out that similar phenomena have long been known. Lantern slides were shown of marble tombstones (particularly that of Prof. Black) in Edinburgh churchyards, which have fallen to pieces in the course of sixty or seventy years, the marble in each case having bent outwards.

Paris.

Academy of Sciences, March 16.—M. Albert Gaudry in the chair.—On the solidification of fluorine and on the combination at $-252^{\circ}\cdot 5$ of solid fluorine and liquid hydrogen, by MM. H. **Moissan** and J. **Dewar** (see p. 497).—The heart in a pathological state, by MM. Ch. **Bouchard** and **Balthazard**. It has been shown that the cardiac area, A, is not sufficient to characterise the dimensions of the organ. It is necessary to determine the ratio of this area to a quantity which characterises the individual examined; the magnitude of the ratio S/A, where S is the albumin normally fixed in the tissue, gives figures which are comparable between themselves. This ratio has been determined in seventy-four cases, and the results obtained are tabulated. It was found that in certain pathological states the heart may have its normal dimensions, in others, tuberculous cases being left out of consideration, the ratio may be above the normal, but never below it.—On bacilliform bovine piroplasmosis, by M. A. **Laveran**.—On the effect of temperature on electrocapillary phenomena, by M. **Gouy**. In general, the maximum height observed decreases with a rise of temperature, and for water and certain inorganic salts the temperature coefficient is practically the same. The coefficient is smaller for the organic substances examined.—On the present state of the Soufrière of Guadeloupe, by M. A. **Lacroix**. The volcanic manifestations of Guadeloupe have not changed their nature; the present observations, like all those which have been made since the last eruption in 1837, shows that the activity of the fumerolles undergoes variations in intensity, and also that they are not fixed in position.—On the existence of derived functions, by M. H. **Lebesgue**.—On geodesics of three dimensions, by M. A. **Boulanger**.—On the theory of the tempering of steel, by M. André **Le Chatelier**.—Propagation in conducting media, by M. Marcel **Brillouin**.—On the dielectric cohesion of mixture of gases, by M. **Bouty**. The critical field for a gaseous mixture is intermediate between that of either of the constituent gases, and for gases which do not act chemically on each other the critical field is exactly the mean of the critical fields of the two gases considered separately at the pressure of the mixture.—On the production of induced radio-activity by actinium, by M. A. **Debierne**. The experiments with actinium described show that there exists a new radiation characterised essentially by the property of rendering radio-active, in a temporary manner, the bodies which it strikes.—On the heat given off spontaneously by radium salts, by MM. P. **Curie** and A. **Laborde** (see p. 491).—On the combination of plumbic acid with organic acids, by M. Albert **Colson**. The author has prepared lead tetra-acetate, tetrapropionate and tetrabutyrate by the action of red lead on the corresponding acids.—On the heat of transformation of yellow into red phosphorus, by M. H. **Giran**. The value currently held for this transformation, 19.2 calories, is too great. The application of the Clapyron formula gives a much lower result, about 4 calories, and this has been confirmed experimentally in two ways, by the combustion of the two varieties of phosphorus in the Berthelot bomb, and by the action of bromine.—On collargol, by M. H. **Hanriot**. An examination of the substance sold commercially as collargol showed that it contained 87 per cent. of metallic silver, traces of ammonia and nitric acid, together with an albuminoid material. From the reactions of this substance, the conclusion is drawn that collargol is the soluble salt of an acid, collargolic acid, which is sufficiently strong to displace carbonic acid from carbonates. The fact that silver, or rather a deposit containing silver, is deposited during electrolysis at the positive pole is in accordance with this view.—The action of hot metals on the fatty acids, by M. Al. **Hebert**. The fatty acids, by the action of the more oxidisable metals at a high temperature, are first transformed into ketones, which are then decomposed, giving rise chiefly to carbonic acid, hydrogen and ethylenic hydrocarbons.—The properties of a solution of sodium sulphate, by MM. C. **Marie** and R. **Marquis**. In order to determine whether hydrated sodium sulphate undergoes dehydration in solution on warming, measurements were made of the solubility of sodium chloride in the solution at varying temperatures. The solubility curve was continuous, hence the authors conclude that there is no reason to suppose that the hydrated salt exists as such in solution.—On a new method of preparation of ammonium chloroplumbate, by MM. A. **Seyewetz** and P. **Trawitz.** Lead chloride is treated with hydrochloric acid and the calculated quantity of ammonium persulphate. The transformation is very rapid, 125 grams of lead chloride being converted into the chloroplumbate in two hours.—Diaminoethylenic compounds of cadmium, by M. Ph. **Barbier.**—On some new derivatives of acylcyanacetic esters, by M. Ch. **Schmitt.**—The methylation and condensation of ethyl glutaconate, by M. E. E. **Blaise.**—On tetraphenylbutanediol and its products of dehydration, by M. Amand **Valeur.** This substance is obtained by the action of phenyl-magnesium bromide upon ethyl succinate.—On the distribution in the organism and the elimination of arsenic given medicinally in the form of sodium methylarsenate, by M. A. **Mounyrat.** The arsenic given as sodium methylarsenate has no tendency to accumulate in the organs, and whatever may be the dose absorbed, only a very minute quantity is retained, this being completely eliminated about the thirtieth day after the ingestion.—On the transformations and the epithelial growths which provoke mechanical lesions of the subcutaneous tissues, by M. Ed. **Retterer.**—The Pteraspis in the Ardennes, by M. Louis **Dollo.**—The reflex augmentation of the biliary secretion by the introduction of acid into the duodeno-jejunum, by M. C. **Fleig.**—On the signification of the Cenomanian layer and the fauna of the Maine du Saint-Laurent near Vaches (Basses-Alpes), by M. Charles **Jacob.**—On the anomalies of gravity in certain unstable regions, by M. F. de Montessus **de Ballore.**—The action of zinc on the microbes of water, by M. F. **Dienert.**—Lesions of the nervous system of the newly-born whose mothers are diseased: the mechanism and its consequences, by MM. A. **Charrin** and A. **Léri.**—Regulating apparatus for the circulation of the blood of the newly-born animal, by M. Edouard **Meyer.**—On the diminution of the intensity of the solar radiation, by M. Henri **Dufour.** A comparison of the solar observations made with the Crova actinometer during the first three months of the present year with the results of preceding years shows a distinct falling off in the radiation. Thus it would appear that there is present in the atmosphere a special absorbent for solar radiation which did not exist in the six preceding years, and it is suggested that this may be fine dust from the recent volcanic eruptions.

DIARY OF SOCIETIES.

THURSDAY, March 26.

Royal Society, at 4.30.—Some Physical Properties of Nickel Carbonyl: Prof. J. Dewar, F.R.S., and H. O. Jones.—The Electrical Conductivity imparted to a Vacuum by Hot Conductors: O. W. Richardson.—An Attempt to Estimate the Relative Amounts of Krypton and of Xenon in Atmospheric Air: Sir William Ramsay, F.R.S.—On a New Series of Lines in the Spectrum of Magnesium: A. Fowler.—An Inquiry into the Variation of Angles Observed in Crystals, especially of Potassium-Alum and Ammonium-Alum: Prof. H. A. Miers, F.R.S.—On the Dependence of the Refractive Index of Gases on Temperature: G. W. Walker.—Solar Prominence and Spot Circulation, 1872–1901: Sir Norman Lockyer F.R.S., and Dr. W. J. S. Lockyer.—On the Evolution of the Proboscidea: Dr. C. W. Andrews.

Institution of Electrical Engineers, at 8.—Distribution Losses in Electric Supply Systems: A. D. Constable and E. Fawssett.—A Study of the Phenomenon of Resonance in Electric Circuits by the Aid of Oscillograms: M. B. Field.—*Time permitting*:—Divided Multiple Switchboards: an Efficient Telephone System for the World's Capitals: W. Aitken.

FRIDAY, March 27.

Royal Institution, at 9.—The Pearl Fisheries of Ceylon: Prof. W. A. Herdman, F.R.S.

Institution of Civil Engineers, at 8.—The Advantages of Motor-Driven Printing Machines: J. G. Y. D. Morgan.

Physical Society, at 5.—Evaluation of the Absolute Zero: Dr. R. A. Lehfeldt.—On Refraction at a Cylindrical Surface: A. Whitwell.

SATURDAY, March 28.

Royal Institution, at 3.—Light: Its Origin and Nature: Lord Rayleigh.

MONDAY, March 30

Institute of Actuaries, at 5.—The Mortality Experience of the Imperial Forces during the War in South Africa, October 11, 1899, to May 31, 1902: F. Schooling and E. A. Rusher.

TUESDAY, March 31.

Royal Institution, at 5.—Great Problems in Astronomy: Sir Robert Ball, F.R.S.

Society of Arts, at 4.30.—British North Borneo: Henry Walker.

Institution of Civil Engineers, at 8.—American Locomotive Practice: P. J. Cowan.

WEDNESDAY, April 1.

Society of Arts, at 8.—Application of Polyphase Motors to the Electrical Driving of Workshops and Factories: A. C. Eborall.

Society of Public Analysts, at 8.—Recent Advances in the Bacteriological Examination of Water: W. H. Jollyman.—The Ash of British Pharmacopœia Drugs: W. Chattaway and C. G. Moor.

Entomological Society.—Contributions towards the Life History of *Orina* (*Chrysochloa*) *tristis* var. *Smaragdina*: Dr. T. A Chapman.

THURSDAY, April 2.

Linnean Society, at 8.—List of Marine Algæ collected at the Maldive and Laccadive Islands by J. Stanley Gardiner: Mrs. Gepp (Ethel S. Barton).—The Comparative Anatomy of Cyatheaceæ and other Ferns: D. T. Gwynne-Vaughan.

Chemical Society, at 8.—On the Absorption Spectra of Nitric Acid in Various States of Concentration: W. N. Hartley.—The Dioximes of Camphorquinone and Other Derivatives of *Iso*nitrosocamphor: M. O. Forster. Salts of a Mercaptoid Isomeric Form of Thioallophanic Acid, and a New Synthesis of Iminocarbaminethioalkyls: A. E. Dixon.—Discoloured Rain: E G. Clayton.—Derivatives of *o*-Aminobenzophenone and *p*-Aminobenzophenone: F. D. Chattaway.

Royal Geographical Society, at 4.—Geographical Education; with Special Reference to Globular Contoured Maps, Globes and Reliefs: Prof. E. Reclus.

Röntgen Society, at 8.30.—Some Effects produced by Radiations: J. H. Gardiner.

FRIDAY, April 3

Malacological Society, at 8.—Additions to the genus Streptaxis: G. K. Gude.—On a New Species of the genus Xylophaga from the English Coast: E. A. Smith.—Notes on some New or Little Known Members of the Family Doridiidæ: Sir Charles Eliot.—On a New Species of Cerastus from near Aden, with a Note on *Otopoma clausum*, Sby.: E. R. Sykes.—Descriptions of Two Supposed New Species of Cyathopoma: H. B. Preston.—On Shells Floating on the Surface of the Sea: August Krogh.

Royal Institution, at 9.—Drops and Surface Tension: Lord Rayleigh.

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